# UNITED STATES DEPARTMENT OF AGRICULTURE
# NATURAL RESOURCES CONSERVATION SERVICE

# ECOLOGICAL SITE DESCRIPTION

## ECOLOGICAL SITE CHARACTERISTICS

**Site Type**: Rangeland

**Site ID**: R036XB115NM

**Site Name**: Deep Sand

**Precipitation or Climate Zone**: 10 to 16 inches

**Phase**:

## PHYSIOGRAPHIC FEATURES

**Narrative**:

This site occurs on level to gently sloping or undulating topography. Slopes range most often from 1 to 10 percent. Elevations vary from about 6,000 to 7,300 feet above sea level.

**Land Form:**

1. Plain
2.
3.

**Aspect:**

1. N/A
2.
3.

| | Minimum | Maximum |
|---|---|---|
| **Elevation (feet)** | 6,000 | 7,300 |
| **Slope (percent)** | 1 | 10 |
| **Water Table Depth (inches)** | N/A | N/A |

| **Flooding:** | **Minimum** | **Maximum** |
|---|---|---|
| **Frequency** | N/A | N/A |
| **Duration** | N/A | N/A |

| **Ponding:** | **Minimum** | **Maximum** |
|---|---|---|
| **Depth (inches)** | N/A | N/A |
| **Frequency** | N/A | N/A |
| **Duration** | N/A | N/A |

**Runoff Class**:

Negligible to medium.

## CLIMATIC FEATURES

**Narrative**:

Average annual precipitation varies from about 10 inches to just over 16 inches. Fluctuations ranging from about 5 inches to 25 inches are not uncommon. The overall climate is characterized by cold dry winters in which winter moisture is less than summer. As much as half or more of the annual precipitation can be expected to come during the period of July through September. Thus, fall conditions are often more favorable for good growth of cool-season perennial grasses, shrubs, and forbs than are those of spring.

The average frost-free season is about 120 days and extends from approximately mid May too early or mid September. Average annual air temperatures are 50 degrees F or lower and summer maximums rarely exceed 100 degrees F. Winter minimums typically approach or go below zero. Monthly mean temperatures exceed 70 degrees F for the period of July and August.

Rainfall patterns generally favor warm-season perennial vegetation, while the temperature regime tends to favor cool-season vegetation. This creates a somewhat complex community of plants on a given ecological site, which is quite susceptible to disturbance and is at or near its productive potential only when both the natural warm/cool-season dominants are present.

Climate data was obtained from http://www.wrcc.sage.dri.edu/summary/climsmnm.html web site using 50% probability for freeze-free and frost-free seasons using 28.5 degrees F and 32.5 degrees F respectively.

| | Minimum | Maximum |
|---|---|---|
| **Frost-free period (days)**: | 102 | 148 |
| **Freeze-free period (days)**: | 119 | 174 |
| **Mean annual precipitation (inches)**: | 10 | 16 |

**Monthly moisture (inches) and temperature ($^0$F) distribution:**

| | Precip. Min. | Precip. Max. | Temp. Min. | Temp. Max. |
|---|---|---|---|---|
| January | .40 | .91 | 12.9 | 47.0 |
| February | .43 | .65 | 16.6 | 51.2 |
| March | .47 | 1.10 | 20.9 | 57.1 |
| April | .30 | .49 | 26.1 | 65.3 |
| May | .46 | .98 | 33.4 | 74.2 |
| June | .51 | .57 | 41.4 | 84.2 |
| July | 2.15 | 3.45 | 50.4 | 85.1 |
| August | 2.28 | 3.03 | 48.7 | 82.4 |
| September | 1.29 | 1.68 | 41.4 | 77.9 |
| October | .81 | 1.12 | 29.4 | 69.2 |
| November | .38 | .71 | 19.1 | 57.3 |
| December | .53 | .95 | 13.1 | 48.9 |

**Climate Stations**:

| | | | | Period | | |
|---|---|---|---|---|---|---|
| Station ID | 290640 | Location | Augustine 2E, NM | From: 05/01/26 | To: | 07/31/00 |
| Station ID | 296812 | Location | Pietown 19NE, NM | From: 09/01/88 | To: | 07/31/00 |
| Station ID | 297180 | Location | Quemado, NM | From: 08/01/15 | To: | 07/31/00 |

## INFLUENCING WATER FEATURES

**Narrative**:

This site is not influenced by water form a wetland or stream.

**Wetland description:**

| System | Subsystem | Class |
|---|---|---|
| N/A | | |

**If Riverine Wetland System enter Rosgen Stream Type**:
**N/A**

## REPRESENTATIVE SOIL FEATURES

**Narrative**:

The soils of this site are typically eolian deposits of coarse sands, fine sands, or loamy sands over similarly coarse textured underlying layers. They are deep, have rapid permeability, and moderate to low available water-holding capacity. They are subject to severe soil blowing whenever plant cover becomes sparse.

**Parent Material Kind**: Eolian deposits
**Parent Material Origin**: Sandstone-unspecified

**Surface Texture:**

| |
|---|
| 1. Loamy sand |
| 2. Fine sand |
| 3. Loamy fine sand<br>4. Fine sandy loam<br>5. Sand |

**Texture Modifier:**

| |
|---|
| 1. N/A |
| 2. |
| 3. |

**Subsurface Texture Group:** Sandy

**Surface Fragments <=3" (% Cover):** N/A

**Surface Fragments >3" (% Cover)**: N/A

**Subsurface Fragments <=3" (%Volume)**: 15 to 35

**Subsurface Fragments >=3" (%Volume)**: N/A

| | **Minimum** | **Maximum** |
|---|---|---|
| **Drainage Class**: | Well | Excessively |
| **Permeability Class**: | Moderately slow | Very rapid |
| **Depth (inches)**: | 72 | >72 |
| **Electrical Conductivity (mmhos/cm)**: | 0.00 | 2.00 |
| **Sodium Absorption Ratio**: | 0.00 | 5.00 |
| **Soil Reaction (1:1 Water)**: | 6.1 | 8.4 |
| **Soil Reaction (0.1M CaCl2)**: | N/A | N/A |
| **Available Water Capacity (inches)**: | 3 | 9 |
| **Calcium Carbonate Equivalent (percent)**: | N/A | N/A |

# PLANT COMMUNITIES

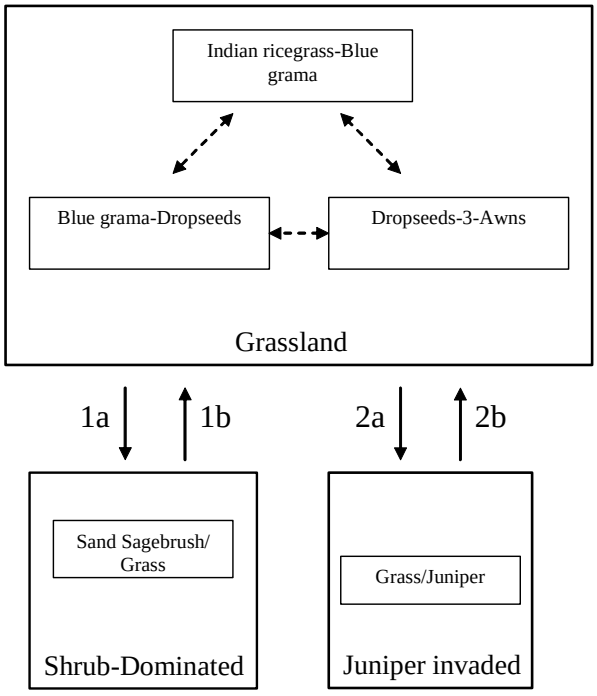
**Ecological Dynamics of the Site**:

**Overview**

The Deep Sand site occurs on piedmont slopes, cuestas, and hill slopes, often in association with sandy sites. The historic plant community of the Deep Sand site has a grassland aspect characterized by both warm and cool season grasses, scattered shrubs and forbs. Indian ricegrass and blue grama are the dominant grasses, with spike dropseed and sand dropseed occurring as subdominants. Sand sagebrush and fourwing saltbush are characteristic shrubs. Purple aster, threadleaf groundsel, globemallow, and spectacle pod are forbs common to this site. This site is susceptible to shrub encroachment and juniper invasion. Decreased grass cover due to overgrazing and drought in conjunction with resource competition may cause the transition to the Shrub-Dominated state. Dispersal of juniper seeds, competition for resources, loss of grass cover, and possibly lack of fire may facilitate the transition to a Juniper-Invaded state.

**Plant Communities and Transitional Pathways (diagram)**

MLRA 36, WP-2 Deep Sand




1a. Loss of grass cover, resource competition.
1b. Brush control, prescribed grazing.

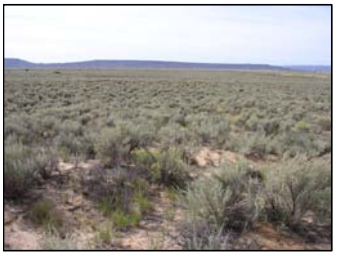
2a. Juniper seed dispersal, loss of grass cover, resource competition.
2b. Brush control, prescribed grazing.

# MLRA 36; WP-2; Deep Sand

## Grassland


•Dropseeds with few scattered 4-wing saltbush.
•Grass cover relatively uniform, with some large (>1m) bare patches evident.
•. Mespun fine sand, Cibola Co., NM.

## Shrub-Dominated




•Sand sagebrush, with scattered dropseeds, blue grama, and Indian ricegrass
•Shrub cover high
•Bare Ground interconnected, with isolated grass patches.
•Mespun fine sand, Cibola Co., NM.

## Juniper-Invaded


•Blue grama/Juniper, with some dropseeds, Indian ricegrass, galleta.
•Grass cover variable, ranging from fairly uniform to patchy
•Grasses pedestalled, bare areas deflated.
•Mespun loamy sand, Cibola Co., NM.

## Juniper-Invaded Blowout area


•Juniper, broom snakeweed, yucca, few scattered blue grama, dropseeds
•Bare ground interconnected with scattered grass plants
•Note exposed Juniper roots.
•Mespun loamy sand, Cibola Co., NM.

**Plant Community Name**: Historic Climax Plant Community

**Plant Community Sequence Number**: 1 **Narrative Label**: HCPC

**Plant Community Narrative**: State Containing Historic Climax Plant Community
***Grassland State:*** Indian ricegrass and blue grama are co-dominants in the historic plant community, with sand dropseed and spike dropseed occurring as the sub dominant grasses. Other grass species that often occur in significant amounts include galleta, western wheatgrass, bottlebrush squirreltail, needle and thread, and New Mexico feathergrass. Principal shrubs include sand sagebrush and fourwing saltbush. Rabbitbrush, broom snakeweed, and yucca may also be found scattered across the site. Continuous heavy grazing can cause a decrease in cool-season grasses, such as Indian ricegrass and western wheatgrass. Communities dominated by blue grama or dropseeds may result.

Diagnosis: Grass cover is relatively uniform, however, bare ground typically makes up a large percent of the total ground cover. Shrubs are scattered with canopy cover averaging 5 percent. The soils exhibit rapid permeability limiting the effects of water erosion. With adequate grass cover there is usually limited evidence of blowouts and coppicing.

| | |
|---|---|
| Canopy Cover: | |
| Trees | |
| Shrubs and half shrubs | 5 % |
| Ground Cover (Average Percent of Surface Area). | |
| Grasses & Forbs | 18 |
| Bare ground | 72 |
| Surface gravel | 0 |
| Surface cobble and stone | 0 |
| Litter (percent) | 10 |
| Litter (average depth in cm.) | 1 |

**Plant Community Annual Production (by plant type)**:

**Annual Production (lbs/ac)**

| Plant Type | Low | RV | High |
|---|---|---|---|
| **Grass/Grasslike** | 220 | 470 | 720 |
| **Forb** | 33 | 71 | 108 |
| **Tree/Shrub/Vine** | 22 | 47 | 72 |
| **Lichen** | | | |
| **Moss** | | | |
| **Microbiotic Crusts** | | | |
| **Total** | 275 | 588 | 900 |

**Plant Community Composition and Group Annual Production**:

**Plant Type - Grass/Grasslike**

| Group Number | Scientific Plant Symbol | Common Name | Species Annual Production | Group Annual Production |
|---|---|---|---|---|
| 1 | BOGR2 | Blue Grama | 118 – 147 | 118 – 147 |
| 2 | ACHY | Indian Ricegrass | 118 – 147 | 118 – 147 |
| 3 | SPCO4<br>SPCR | Spike Dropseed<br>Sand Dropseed | 88 – 118 | 88 – 118 |
| 4 | MUTO2<br>MUAR2<br>PLJA | Ring Muhly<br>Sandhill Muhly<br>Galleta | 6 – 18 | 6 – 18 |
| 5 | PASM<br>ELEL5<br>HENE2<br>HECO26 | Western Wheatgrass<br>Bottlebrush Squirreltail<br>New Mexico Feathergrass<br>Needleandthread | 29 – 88 | 29 – 88 |
| 6 | BOER4<br>BOCU | Black Grama<br>Sideoats Grama | 6 – 18 | 6 – 18 |
| 7 | ARIST | Threeawn spp. | 6 – 18 | 6 - 18 |

**Plant Type - Forb**

| Group Number | Scientific Plant Symbol | Common Name | Species Annual Production | Group Annual Production |
|---|---|---|---|---|
| 8 | 2FP | Other Perennial Forbs | 6 – 59 | 6 – 59 |
| 9 | 2FA | Other Annual Forbs | 6 – 29 | 6 - 29 |

**Plant Type – Tree/Shrub/Vine**

| Group Number | Scientific Plant Symbol | Common Name | Species Annual Production | Group Annual Production |
|---|---|---|---|---|
| 10 | ARFI2<br>ATCA2<br>YUGL | Sand Sagebrush<br>Fourwing Saltbush<br>Small Soapweed | 6 – 29 | 6 – 29 |
| 11 | ERNAN5<br>GUSA2 | Rubber Rabbitbrush<br>Broom Snakeweed | 6 – 18 | 6 – 18 |
| 12 | 2SD | Other Shrubs | 6 – 18 | 6 - 18 |

**Plant Type - Lichen**

| Group Number | Scientific Plant Symbol | Common Name | Species Annual Production | Group Annual Production |
|---|---|---|---|---|
| | | | | |
| | | | | |

**Plant Type - Moss**

| Group Number | Scientific Plant Symbol | Common Name | Species Annual Production | Group Annual Production |
|---|---|---|---|---|
| | | | | |
| | | | | |

**Plant Type - Microbiotic Crusts**

| Group Number | Scientific Plant Symbol | Common Name | Species Annual Production | Group Annual Production |
|---|---|---|---|---|
| | | | | |
| | | | | |

**Plant Growth Curves**

**Growth Curve ID** **0306NM**

**Growth Curve Name**: **HCPC**

**Growth Curve Description**: **Mixed warm/cool-season grassland w/low growing shrubs and half-shrubs and a variety of forbs.**

| Jan. | Feb. | March | April | May | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0 | 5 | 7 | 10 | 15 | 25 | 25 | 8 | 5 | 0 | 0 |

Additional States:

**Shrub-Dominated*:*** This state is characterized by the predominance of shrubs, especially sand sagebrush. Perennial grasses are the subordinate component. The grass component is typically a low-vigor, blue grama-dropseeds community with increased amounts of threeawns, ring muhly, sandhill *muhly and bare ground.*

**Diagnosis**: Grass cover is patchy, usually dominated by low-vigor blue grama and dropseeds. Shrub cover averages 20 percent or greater. Evidence of wind erosion such as pedestalling of plants, and soil deposition may be common.

**Transition to Shrub-Dominated** (1a) Loss of grass cover due to overgrazing and/or extended drought, and increased competition for resources by shrubs may facilitate the transition to the Shrub-Dominated State. Sand sagebrush is well adapted to the sandy soils of this site. Prolific seed production, rapid germination, its ability to remain viable over time, and adaptability to low fertility soils enable this species to take advantage of favorable climatic conditions and quickly occupy a site.

**Transition back to Grassland (1b)** Brush control is necessary to reduce the competitive influence of shrubs and reestablish grass dominance. Follow up treatment may be necessary due to re-growth the following year and seed reserves remaining in the soil.[1] Impacts on erosion and wildlife habitat should be a carefully considered part of the brush management plan. The amount of soil degradation may dictate the degree to which the system is capable of recovery.

***Juniper-Invaded State*** This state is characterized by the presence of juniper. Blue grama is often the dominant grass with dropseeds, galleta, Indian ricegrass, and threeawns occurring as the subdominants. Western wheatgrass may or may not be present.

Diagnosis: Juniper is present on the site. Grass cover is variable, ranging from relatively uniform to patchy with large connected bare areas present. Evidence of erosion such as pedestalling of plants, wind scoured areas, or blowouts may be common.

**Transition to Juniper-Invaded State (2a)** Seed dispersal, loss of grass cover, and resource competition are all believed to facilitate juniper invasion. Wildlife (especially birds) are considered important dispersal agents facilitating the encroachment of juniper.[4] Sites adjacent to areas with existing juniper communities may be at increased risk of juniper seed introduction and establishment. Competition is most important during shrub seedling establishment, during which time juniper seedlings and grasses may be competing directly for limited soil moisture.[2] Overgrazing may facilitate the establishment of juniper seedlings by providing competition free areas, but livestock exclusion alone may not prevent juniper establishment. During wet years competition for available soil moisture is reduced and juniper seedling may establish in healthy stands of grass.[2] Additionally, the natural spatial variability of ground cover may allow shrubs to establish on bare areas within good grass stands when adequate moisture is available.[3]

Key indicators of approach to transition:

- Increase in size and frequency of bare patches.
- Increase in amount of juniper seedlings.

**Transition back to Grassland (2b)** Prescribed grazing is necessary to restore and maintain adequate grass cover and limit further erosion. Brush control, either mechanical or chemical can be used to remove juniper and facilitate grass recovery.

# ECOLOGICAL SITE INTERPRETATIONS

**Animal Community**:

Habitat for Wildlife:

This ecological site provides habitats which support a resident animal community that is characterized by pronghorn antelope, kit fox, badger, desert cottontail, spotted ground squirrel, Ord's kangaroo rat, white-throated woodrat, Botta's pocket gopher, plains pocket mouse, Northern grasshopper mouse, sparrow hawk, mourning dove, meadowlark, chipping sparrow, plains spadefoot toad, Eastern fence lizard, plateau whiptail, short-horned lizard and prairie rattlesnake.

Common raven and prairie falcon hunt over the site and black-chinned sparrow nest here. Where dense stands of large pinyon, juniper or ponderosa pine occur, woodland wildlife species such as mule deer, gray fox, rock squirrel, harlequin quail, pinyon jay, scrub jay, chipping sparrow and Cassin's kingbird become site-characteristic.

**Hydrology Functions:**

The runoff curve numbers are determined by field investigations using hydrologic cover conditions and hydrologic soil groups.

| Hydrologic Interpretations | |
|---|---|
| **Soil Series** | **Hydrologic Group** |
| Berent | A |
| Loarc | B |
| Mespun | A |
| Mido | A |
| Palma | A |
| Pinaventes | A |
| Razito | A |
| Royosa | A |
| Sheppard | A |
| Telescope | A |

**Recreational Uses**:

This site offers fair potential for hiking, horseback riding, nature observation, photography, camping, and picnicking. It also provides fair to good opportunity for pronghorn antelope hunting.

Natural beauty is dependent upon scattered flowering shrubs and forbs, and the general, open grassland character of the site.

**Wood Products**:

This site has no significant value for wood products.

**Other Products**:

Grazing:

This site is suitable for grazing by most kinds and classes of livestock in all seasons of the year. It is, however, poorly suited for continuous yearlong use if the natural potential vegetation is to be maintained. Under such use, cool-season grasses such as Indian ricegrass may decline rapidly. If use is heavy and prolonged, such species as blue grama and black grama will also decline. Increased amounts of bare soil, an increase or invasion by woody plants and annuals, and such grasses as sandhill muhly, threeawns, and ring muhly characterize severe site deterioration. Soil blowing and hummocking also occur under this condition and production is cut severely. The site is also sometimes invaded by woody species such as pinyon pine and juniper, or in rare instances, ponderosa pine, and may support relatively long-lived stands of these species.

**Other Information:**

**Guide to Suggested Initial Stocking Rate Acres per Animal Unit Month**

| Similarity Index | Ac/AUM |
|---|---|
| 100 - 76 | 3.7 – 5.0 |
| 75 – 51 | 4.8 – 7.0 |
| 50 – 26 | 6.8 – 13.0 |
| 25 – 0 | 13.0+ |

| Plant Part | Code | Species Preference | Code |
|---|---|---|---|
| **Stems** | **S** | **None Selected** | **NS** |
| **Leaves** | **L** | **Preferred** | **P** |
| **Flowers** | **F** | **Desirable** | **D** |
| **Fruits/Seeds** | **F/S** | **Undesirable** | **U** |
| **Entire Plant** | **EP** | **Not Consumed** | **NC** |
| **Underground Parts** | **UP** | **Emergency** | **E** |
| | | **Toxic** | **T** |

**Plant Preference by Animal Kind**:

**Animal Kind**: Livestock
**Animal Type**: Cattle

| Common Name | Scientific Name | Plant Part | Forage Preferences | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | J | F | M | A | M | J | J | A | S | O | N | D |
| Indian Ricegrass | Achnatherum hymenoides | EP | P | P | P | P | P | P | P | P | P | P | P | P |
| Blue Grama | Bouteloua gracilis | EP | D | D | D | D | P | P | P | P | P | D | D | D |
| Black Grama | Bouteloua eriopoda | EP | P | P | P | D | D | D | D | D | D | D | P | P |
| Galleta | Plueraphis jamesii | EP | U | U | U | U | U | D | D | D | D | D | U | U |
| Western Wheatgrass | Pascopyrum smithii | EP | D | D | P | P | P | D | D | D | D | D | D | D |
| Bottlebrush Squirreltail | Elymus elymoides | EP | U | U | D | D | D | U | U | U | D | D | D | U |
| New Mexico Feathergrass | Hesperostipa neomexicana | EP | D | D | P | P | P | D | D | D | D | D | D | D |
| Needleandthread | Hesperostipa comata | EP | D | D | P | P | P | D | D | D | D | D | D | D |
| Sideoats Grama | Bouteloua curtipendula | EP | P | P | P | P | P | P | P | P | P | P | P | P |
| Fourwing Saltbush | Atriplex canescens | EP | P | P | P | P | P | D | D | D | D | D | D | P |
| Some Forbs | Various | EP | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S |

**Animal Kind**: Livestock
**Animal Type**: Sheep

| Common Name | Scientific Name | Plant Part | Forage Preferences | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | J | F | M | A | M | J | J | A | S | O | N | D |
| Indian Ricegrass | Achnatherum hymenoides | EP | P | P | P | P | P | D | D | D | D | D | D | P |
| Most Perennial Forbs | Various | EP | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S |
| Some Annual Forbs | Various | EP | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S |
| Western Wheatgrass | Pascopyrum smithii | EP | U | U | D | D | D | D | D | D | D | D | D | U |
| Bottlebrush Squirreltail | Elymus elymoides | EP | U | U | D | D | D | U | U | U | U | U | U | U |
| Fourwing Saltbush | Atriplex canescens | EP | P | P | P | P | P | D | D | D | D | D | D | P |

**Animal Kind**: Wildlife

**Animal Type**: Antelope

| Common Name | Scientific Name | Plant Part | Forage Preferences | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | J | F | M | A | M | J | J | A | S | O | N | D |
| Indian Ricegrass | Achnatherum hymenoides | EP | U | U | P | P | P | U | U | U | D | D | D | U |
| Most Perennial Forbs | Various | EP | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S |
| Some Annual Forbs | Various | EP | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S | N/S |
| Western Wheatgrass | Pascopyrum smithii | EP | U | U | D | D | D | U | U | U | U | U | U | U |
| Bottlebrush Squirreltail | Elymus elymoides | EP | U | U | D | D | D | U | U | U | U | U | U | U |
| Fourwing Saltbush | Atriplex canescens | EP | D | D | D | D | D | D | D | D | D | D | D | D |

## SUPPORTING INFORMATION

**Associated sites**:

| Site Name | Site ID | Site Narrative |
|---|---|---|
| | | |

**Similar sites**:

| Site Name | Site ID | Site Narrative |
|---|---|---|
| | | |

**State Correlation**:

**This site has been correlated with the following sites**: _____

**Inventory Data References**:

| Data Source | # of Records | Sample Period | State | County |
|---|---|---|---|---|
| | | | | |

**Type Locality**:

**State**: **New Mexico**

**County**: **Catron, Socorro**

**Latitude**: _____

**Longitude**: _____

**Township**: _____

**Range**: _____

**Section**: _____

**Is the type locality sensitive?** **Yes** ☐ **No** ☐

**General Legal Description**: _____

**Relationship to Other Established Classifications**:

**Other References:**

Data collection for this site was done in conjunction with the progressive soil surveys within the New Mexico and Arizona Plateaus and Mesas 36 Major Land Resource Area of New Mexico. This site has been mapped and correlated with soils in the following soil surveys: McKinley, Cibola, Catron, Socorro, Sandoval.

1. Bovey R.W. 1964. Aerial application of herbicides for control of sand sagebrush. Journal of Range Management. 17: 253-256

2. Johnsen, T.N., Jr. 1962. One-seeded juniper invasion of northern Arizona grasslands. Ecological Monographs. 32:187-207.

3. Jurena, P.N. and S. Archer. 2003. Woody plant establishment and spatial heterogeneity in Grasslands. Ecology 84: 907-919

4. Phillips, F. J. 1910. The dissemination of junipers by birds. Forest Quart. 8: 60-73. (From Expt. Sta. Rec. 22: 644.)

| **Characteristic Soils Are:** | |
|---|---|
| Berent, Loarc, Mespun, Mido, Palma | Penavetes, Razito, Royosa, Sheppard |
| Telescope | |
| **Other Soils included are:** | |
| | |

**Site Description Approval:**

| **Author** | **Date** | **Approval** | **Date** |
|---|---|---|---|
| Don Sylvester | 02/15/80 | Durwood E. Ball | 03/27/80 |

| **Site Description Revision:** | **Date** | **Approval** | **Date** |
|---|---|---|---|
| David Trujillo | 12/16/04 | George Chavez | 03/03/05 |